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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. 09/700,182 | Applicant(s) Ferddinand et al | |
|---|---|---|---|
| | Examiner Audrey Y. Chang | Art Unit 2872 | |

*-- Th MAILING DATE of this communication app ars on th cover she t with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *05 December 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *13-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *8* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

## DETAILED ACTION

### *Remark*

- This Office Action is in response to applicant's preliminary amendment filed on December 5, 2000, which has been entered as paper number 6.
- By this amendment, the applicant has canceled claims 1-12 and has newly added claims 13-24.
- Claims 13-24 remain pending in this application.

### *Drawings*

1. The subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81. No new matter may be introduced in the required drawing.

### *Specification*

2. The abstract of the disclosure is objected to because it contains more than one paragraphs and it contains language such as "according to the invention" that makes the abstract not precise. Correction is required. See MPEP § 608.01(b).

### *Claim Objections*

3. Claim 13 is objected to because of the following informalities: the phrase "one f the said light beams" is in error. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. **Claims 13-24 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.**

The specification fails to teach that the phase splitter "divide ... light beam into at least two sub-beams" as recited in claim 13. The specification only gives support for the phase splitter to impart different phase shift to different **portions** of the light beam but **does not** give support for **splitting** the light beam into sub-beams which by definition are separated beams or separable. Clarifications are required.

6. **Claim 16 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.**

The specification fails to teach how does the position of the phase shift or the value of the phase shift is modified by time as recited in claim 16.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. **Claims 13-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly

set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, **claim 13** recites the broad recitation "forming a light guide", and the claim also recites "particularly in an optical fiber" which is the narrower statement of the range/limitation. Also, **claim 23** recites the broad recitation "determine index modulation envelope" and the claim also recites "particularly an apodized Bragg grating" which is the narrow statement of the range/limitations.

The phrase "the interference pattern ... is transferred directly into the substrate" recited in claim 13 and the phrase "the interference pattern is transferred" recited in various claims are vague, indefinite and in error since it is not clear how can the "interference pattern" be "transferred". The applicant is respectfully noted that the interference pattern is formed by the two coherent beams **at** the substrate or **at the place** they intercept each other. Before these two beams intercept each other, which in this case occurs at the substrate, there is **no interference pattern** exists so no such pattern can be **transferred** in any way.

The phrase "the Bragg network" recited in claim 13 is vague and indefinite since it lacks proper antecedent basis.

Claims 13 and 14 are functional since they each fails to provide appropriate means for carrying out the functions "according an amplitude separation configuration" and "according a wave front separation configuration".

The phase "the position of the phase shift" recited in claim 16 appears to be vague and indefinite since a "phase shift" is a **mathematical abstract object** that doe not have a **physical position**.

The phrase "a phase shift" recited in claim 17 appears to be vague and indefinite since it is not clear how does this phase shift relate to the phase shift recited in its based claim.

Claims 18 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: between the interferometric means and the elements recited in the apparatus for writing the Bragg grating recited in their based claims. The alternative phrase "a prism or a Lloyd folded mirror" recited in claim 19 appears to be vague and indefinite since prism and folded mirror are not equivalent which therefore makes the scope of the claim unclear.

Claims 21 and 23 are narrative, functional and confusing. It is not clear what are the scopes and the limitations of the claims.

Clarifications are required. Claims 14-24 inherit the rejection from their respective based claim.

### *Claim Rejections - 35 USC § 102*

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

**10. Claims 13 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by the patent issued to Kashyap (PN. 6,307,679).**

Kashyap teaches an *apparatus and method* for forming *refractive index grating* in an *optical fiber* (8) that operates as a *Bragg grating* wherein the apparatus and method comprises the step of creating *two coherent light beams* from a light source, and using an *interferometric arrangement*, including several *mirrors* (5 and 6, Figure 1) to send the two light beams to intercept and interfere with each other at the *optical fiber* serves as the *transparent substrate* (8), (please see Figure 1). The interference pattern sets up a pattern of refractive index grating within the optical fiber, which is a photosensitive medium, (please see columns 1 and 5). Kashyap teaches that in the optical path of one of the light beams (3), a *transparent wedge* (15), which serves as the *phase splitter*, is placed to introduce progressive *phase shift* to the wavefront of the beam across its width and this effectively causes the light beam to have a plurality of sub-portions having different phase shift values. These sub-portions serve as the *sub-beams*. The phase shift certainly affects the Bragg grating formed. With regard to claim 14, Kashyap does not teach explicitly about the interference pattern is formed according to an amplitude separation configuration. Kashyap however does teach that the refractive index grating is formed by using the interferometric arrangement including several mirrors, (Figure 1), which is disclosed by the applicant as an arrangement for creating the grating according to an amplitude separation configuration. This feature is therefore implicitly included by the disclosure. This reference therefore anticipates the claims.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**12. Claims 15, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kashyap.**

The apparatus and the method for forming a refractive index grating in an optical fiber taught by Kashyap as described for claim 13 above has met all the limitations of the claims. With regard to claim 15, Kashyap fails to teach explicitly that the interference pattern is formed according to a wave front separation configuration. However this configuration is pretty well known in the art and the specification does not teach the criticality of having this particular configuration would overcome any problem in the prior art such modification is therefore considered as an obvious matter of design choice to one skilled in the art.

With regard to claim 21, Kashyap teaches that a pre-written Bragg grating with no phase shift introduced to the recording beam (3a) may be formed within the optical fiber before recording the Bragg grating with phase shifting arrangement, (please see Figure 5 and columns 5-6). The scope of the claim is not definite for the reasons stated above. The claim therefore cannot be examined in details after the above interpretation and understanding.

With regard to claim 23, Kashyap teaches that the refractive index grating operates as a Bragg grating is an apodized Bragg grating, (please see the abstract). The scope of the claim is not definite for the reasons stated above. The claim therefore cannot be examined in details after the above interpretation and understanding.

**13. Claims 16-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kashyap in view of the patent issued to Inoue et al (PN. 4,792,197).**

The apparatus and the method for forming a refractive index grating in an optical fiber taught by Kashyap as described for claim 13 above has met all the limitations of the claims.

With regard to claims 16-17, this reference however does not teach explicitly to have a means for adjusting the position of the wedge or the phase splitter. Inoue et al in the same field of endeavor teaches an apparatus for recording diffraction grating using a phase shifting material (24) in one of the recording beam paths to introduce different phase shifts to different portion of the beam, (please see Figures 4 and 5), which therefore introduces phase shift to the recorded diffraction grating. Inoue et al teaches that the position of the material (24) may be changed (Figure 6) to impart different phase shifting effect to the light beam and subsequently to the diffraction grating formed. Although this reference does not teach explicitly about this means for adjusting the position of the phase shifting material, it is implicitly included in the disclosure. It would have been obvious to one skilled in the art to apply the teachings of Inoue et al to modify the apparatus of Kashyap to provide a means to adjust the position of the phase shifting wedge for the benefit of introducing different phase shifting effect to the Bragg grating formed. The feature concerning the position is modified with time recited in claim 16 is not addressed here since the specification fails to give support and give adequate teachings about such for the reasons stated in the paragraph above.

With regard to claim 20, Inoue et al teaches the phase shift difference between different portions of the beam could be half of a wavelength or $\pi$, (please see column 3). It would then have been obvious to one skilled in the art to apply the teachings of Inoue et al to modify the apparatus of Kashyap for the benefit of producing desired Bragg grating with desired phase property.

**14. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Kashyap and Inoue et al as applied to claims 13 and 17 above, and further in view of the patent issued to Cook et al (PN. 5,629,998).**

The apparatus for forming refractive index grating in an optical fiber taught by Kashyap in combination with the teachings of Inoue et al as described for claims 13 and 17 above have met all the

limitations of the claim. Kashyap teaches that the refractive index grating is formed by using an interferometric arrangement but it does not teach the interferometric arrangement includes folded mirror. Cook et al in the same field of endeavor teaches a method and apparatus for writing refractive index grating in an optical fiber wherein an interferometric arrangement including the Lloyd's mirror is employed, (please see Figure 1 and columns 1-2). It would then have been obvious to one skilled in the art to apply the teachings of Cook et al to modify the apparatus of Kashyap for the benefit of providing an alternative interferometric arrangement for recording the refractive index Bragg grating in the optical fiber.

**15. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kashyap in view of Brueck et al (PN. 5,617,499).**

The apparatus and the method for forming refractive index grating in an optical fiber taught by Kashyap as described for claim 13 above has met all the limitations of the claim. This reference does not teach explicitly that the Bragg gratings are used to form a Fabry Perot cavity. However using a pair of Bragg gratings to form a Fabry Perot cavity is extremely well known in the art as demonstrated by the teachings of Brueck et al wherein two Bragg gratings (53 and 54 in Figure 4) are used to form the Fabry Perot cavity, (please see Figure 4 and column 5). Such modification and application would have been obvious to one skilled in the art.

**16. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kashyap as applied to claim 13 and 23 above, and further in view of the patent issued to Inoue et al.**

The apparatus and the method for forming a refractive index grating in an optical fiber taught by Kashyap as described for claims 13 and 23 above has met all the limitations of the claims.

This reference however does not teach explicitly to displace the phase shifting wedge or the phase splitter by a programmable movement. Inoue et al in the same field of endeavor teaches an apparatus for recording diffraction grating using a phase shifting material (24) in one of the recording beam paths to introduce different phase shifts to different portion of the beam, (please see Figures 4 and 5), which therefore introduces phase shift to the recorded diffraction grating. Inoue et al teaches that the position of the material (24) may be changed (Figure 6) to impart different phase shifting effects to the light beam and subsequently to the diffraction grating formed. It would have been obvious to one skilled in the art to apply the teachings of Inoue et al to modify the apparatus of Kashyap to adjust the position of the phase shifting wedge for the benefit of introducing different phase shifting effect to the Bragg grating formed. Although this reference does not teach explicitly that the change of position of the material is by a programmable movement such modification is an obvious matter of design choice to one skilled in the art. Since such practice is very well known in the art and since the specification fails to teach the criticality of having such arrangement would overcome any problem in the prior art.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 703-305-6208. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor; Cassandra Spyrou can be reached on 703-308-1637. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

*Audrey Y. Chang*
*Primary Examiner*
*Art Unit 2872*

A. Chang, Ph.D.
November 30, 2001